HANTAVIRUS PULMONARY SYNDROME

DISEASE REPORTING

In Washington

New requirements for the reporting of hantavirus pulmonary syndrome (HPS) were instituted in December of 2000. Since its recognition in 1993, there have been 23 reported cases of HPS in Washington through June 2002 with 8 associated deaths.

Deer mice are the primary reservoir for hantavirus in Washington State; exposure to their nests, urine, feces or saliva places individuals at risk for developing infection. Hantavirus is not transmitted from person to person.

Purpose of reporting and surveillance

- To identify rodent sources of infection.
- To design more effective control or prevention methods.
- To better characterize the epidemiology of this organism.

Reporting requirements

- Health care providers: notifiable to Local Health Jurisdiction within 3 work days
- Hospitals: notifiable to Local Health Jurisdiction within 3 work days
- Laboratories: no requirements for reporting
- Local health jurisdictions: notifiable to DOH Communicable Disease Epidemiology within 7 days of case investigation completion or summary information required within 21 days

CASE DEFINITION FOR SURVEILLANCE

Clinical criteria for diagnosis

An illness characterized by one or more of the following clinical features:

- A febrile illness (i.e., temperature greater than 101° F [greater than 38.3° C]) characterized by bilateral diffuse interstitial edema that may radiographically resemble ARDS, with respiratory compromise requiring supplemental oxygen, developing within 72 hours of hospitalization, and occurring in a previously healthy person.
- An unexplained respiratory illness resulting in death, with an autopsy examination demonstrating noncardiogenic pulmonary edema without an identifiable cause.

Laboratory criteria for diagnosis

- Detection of hantavirus-specific immunoglobulin M or rising titers of hantavirus-specific immunoglobulin G, or
- Detection of hantavirus-specific ribonucleic acid sequence by polymerase chain reaction in clinical specimens, or
- Detection of hantavirus antigen by immunohistochemistry.

Laboratory testing should be performed or confirmed at a reference laboratory. Because the clinical illness is nonspecific and ARDS is common, a screening case definition can be used to determine which patients to test. In general, a predisposing medical condition (e.g., chronic pulmonary disease, malignancy, trauma, burn, and surgery) is a more likely cause of ARDS than HPS, and patients who have these underlying conditions and ARDS need not be tested for hantavirus.

Case definition

- Confirmed: a clinically compatible case that is laboratory confirmed.

A. DESCRIPTION

1. Identification

An acute zoonotic viral disease characterized by fever, myalgias and GI complaints followed by the abrupt onset of respiratory distress and hypotension. The illness progresses rapidly to severe respiratory failure and shock. An elevated hematocrit, hypoalbuminemia and thrombocytopenia are found in most cases. The crude mortality rate is approximately 40%-50%; it was 43% of the first 217 cases identified. In survivors, the recovery from acute illness is rapid, but full convalescence may require weeks to months. Restoration of normal lung function generally occurs, but pulmonary function abnormalities may persist in some individuals. Renal and hemorrhagic manifestations are usually conspicuously absent except in some severe cases.

Diagnosis is made by the demonstration of specific immunoglobulin M (IgM) antibodies by using ELISA, Western blot or strip immunoblot techniques. Most patients have IgM antibodies at the time of hospitalization. PCR analysis of autopsy or biopsy tissues and immunohistochemistry are also established diagnostic techniques in specialized laboratories.

2. Infectious Agent

Multiple hantaviruses have been identified in the Americas: Sin Nombre virus is the agent responsible for the 1993 epidemic in southwest US and most of the other cases identified in North America. Other strains associated with human disease include Black Creek Canal and Bayou viruses (southeastern US), New York-1 and Monongahela viruses (eastern US), Andes virus (Argentina, Chile), Laguna Negra virus (Paraguay, Bolivia) and Juquitiba virus (Brazil).

3. Worldwide Occurrence

The disease was first recognized in the spring and summer of 1993 in the Four Corners area of New Mexico and Arizona, principally among resident Native American populations. Since then, cases have been confirmed in many western states and Canada. Sporadic cases have occurred in eastern regions of the US. Sporadic cases and several outbreaks have been reported in South American countries (e.g., Argentina, Bolivia, Paraguay, Chile, Brazil). The disease is not restricted to any ethnic group. Incidence appears to coincide with the geographic distribution, population density and proportion of carrier rodents that are infected.

4. Reservoir

The major reservoir of Sin Nombre virus appears to be the deer mouse, *Peromyscus maniculatus*. Antibodies have also been found in other *Peromyscus* species, pack rats, the chipmunk and other rodents. Other hantavirus strains identified thus far have been associated predominantly with other sigmodontine rodent species.

5. Mode of Transmission

As with hantavirus caused hemorrhagic fever with renal syndrome, aerosol transmission from rodent excreta is presumed. The natural history of viral infections of host rodents has not been characterized. Indoor exposures in closed, poorly ventilated homes, vehicles and outbuildings with visible rodent infestation are especially prominent.

6. Incubation period

Has not been completely defined but is thought to be approximately 2 weeks with a possible range of a few days to 6 weeks.

7. Period of communicability

Person to person spread of hantaviruses in the US has not occurred. However, person to person transmission has been reported during an outbreak in Argentina.

8. Susceptibility and resistance

All persons without prior infection are presumed to be susceptible. No inapparent infections have been documented to date, but milder infections without frank pulmonary edema have been seen. No second cases have been identified, but the protection and duration of immunity conferred by previous infection is unknown.

B. METHODS OF CONTROL

1. Preventive measures:

a. Exclude and prevent rodent access to houses and other buildings.
b. Store human and animal food under rodent proof conditions.
c. Disinfect rodent contaminated areas by spraying a disinfectant (such as dilute bleach) solution prior to cleaning. Do not sweep or vacuum rat contaminated areas; use a wet mop or towels moistened with disinfectant. Avoid inhalation of dust by using approved respirators when cleaning previously unoccupied areas.
d. Trap and dispose of rodents using suitable precautions. Live trapping is not recommended.
e. In enzootic areas, minimize exposure to wild rodents and their excreta.
f. Laboratory rodent colonies, particularly *Rattus norvegicus*, should be tested to ensure freedom from asymptomatic hantavirus infection.

2. Control of patient, contacts and the immediate environment:

a. Report to local health authority.
b. Isolation: None.
c. Concurrent disinfection: None.
d. Quarantine: None.
e. Immunization of contacts: None.
f. Investigation of contacts and source of infection: Exterminate rodents in and around the households if feasible.
g. Specific treatment: Provide respiratory intensive care management, carefully avoid overhydration that might lead to exacerbation of pulmonary edema. Use cardiotonic drugs and pressors early under careful monitoring to prevent shock. Strictly avoid hypoxia, particularly if transfer is contemplated. Ribavirin is investigational and of no proven benefit. Extracorporeal membrane oxygenation has been used with some success.

3. Epidemic measures

Public education regarding rodent avoidance and rodent control in homes is desirable in endemic situations and should be intensified during epidemics. Monitoring of rodent numbers and infection rates is desirable but as yet of unproven value. Rodent control; surveillance for hantavirus infections in wild rodents. Laboratory associated outbreaks call for evaluation of the associated rodents and, if positive, elimination of the rodents and thorough disinfection.

4. International measures

Control transport of exotic reservoir rodents.